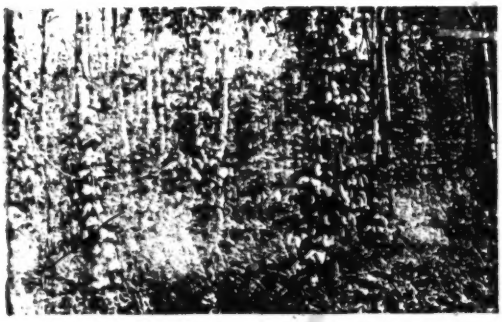
1: Pelzer S-5 (1940-1941) 1945 AL1 Southeast Asia AL1

241
249



FIGS. 25 and 28 (upper left and upper right)—Pepper vines growing in an old *ladang*. Residency of the Lampoeng Districts, Sumatra.

FIG. 26 (center left)—Young rubber tree planted in a rice ladang. No more rice will be planted after the second rice harvest. Western Bali.

FIG. 27 (lower left)—Young rubber trees in an old ladang that has produced two rice crops. Residency of Palembang, Sumatra.

FIG. 29 (lower right)—Closer view of a young rubber tree in the ladang shown in Fig. 27.

[p. 39]

1: Pelzer S-5 (1940-1941) 1945 AL1 Southeast Asia AL1

rice takes up nitrogen in the form of ammonia, the value of green manures on wet-rice fields is apparent.[15] In the Indies, *Crotolaria* species are the most frequently used green manures, the favored one being *Crotolaria juncea* L.; but *Phaseolus lunatus* L., *Dolichos lablab* L., and *Pachyrrhizus erosus* Urban are also used. The peasants of the Red River delta in Tongking are in the habit of working into the ground the wilted matter of a number of legumes that have been grown primarily for seed. The peasants of the province of Nam Dinh have developed a technique that may be unique. They push handfuls of indigo branches into the ground between the rows of rice a few days after the latter has been transplanted, for they believe that indigo is superior to pig manure or human excreta. In Indochina rice-growers frequently cultivate green manure, especially *Crotolaria* species, on dry fields and carry it to the rice fields at the time when these fields are being prepared for the seedlings. A green manure used exclusively in a few districts of the delta land of Tongking is the small aquatic plant, *azolla*.[16] Certain villages, thanks to favorable circumstances, have specialized in the growing of azolla to sell to the surrounding country, while other villages reproduce the plant until sufficient quantities of green manure have been obtained to cover all needs. The life cycle of azolla is completed in the months from November to April or May. Only the villagers of LaVan know the secret of maintaining and multiplying the plant during the hot season. They guard this secret jealously since it is the basis of their livelihood.

Further studies are needed to establish which varieties of green-manure plants are best suited to the various environmental conditions. It is important to find plants that grow rapidly and can be sown when the rice is still on the field, just after the water has been drained off to allow the grain to ripen. Experiments should also be made in the timing of the application of green manure. Should it be early, or just before the transplanting of the seedlings? Should it be on dry or on wet land?

Crop rotation also has its place as a means of keeping up the fertility of wet-rice fields. This practice seems to be better developed and more prevalent in Java than in any other country of Southeastern Asia. Extensive areas of *sawah*, as the Javanese call their wet riceland, are planted with dry-field crops such as maize, legumes, and other vegetables during the dry season, a practice that has a beneficial effect upon the soil. This form of double cropping is probably better than raising two rice crops in one year, because—although a different variety of rice is chosen for each season—both make essentially the same demands upon the soil; whereas a peanut crop, for example, grown during the dry season will enlarge the nitrogen content of the soil. In some areas of Java lowland rice is rotated

[15] Imperial Bureau of Soil Science: Tropical Soils in Relation to Tropical Crops, 1936, p. 11.

[16] For a map showing the extent of the use of azolla, see Gourou: Les paysans, 1936, p. 392. For further discussion see Nguyên-cong-Tiêu: "L'azolle," 1930, B, pp. 335–350 (also in *Proc. Fourth Pacific Science Congress, Java, 1929*, Vol. 4, 1930, pp. 355–370).

1: Pelzer S-5 (1940-1941) 1945 AL1 Southeast Asia AL1

with sugar or tobacco grown under plantation management. But is the high fertility of the soil due to this crop rotation, or is it rather the result of the heavy application of commerical fertilizer and the thorough cultivation of the soil under Western management?

In no country of Southeastern Asia is there so great a variety or so intensive a use of commercial fertilizers as in Japan.[17] In general, the peasants of Southeastern Asia lack money for commercial fertilizers. In Indochina local phosphates are within reach of some of the Annamese, but the costs of imported fertilizers are prohibitive. In Java, although attempts to make possible the use of fertilizers through the agency of public credit institutions were successful in some special instances, not more than one per cent of the cultivated area received any commercial fertilizer in 1939. On the other hand, estimates indicate that more than 1,000,000 hectares of sawah have a phosphate deficiency and that a moderate application of phosphate would augment the yield by 25 to 50 per cent.[18]

The Agricultural Advisory Service was able to raise the productivity of wet-rice fields in West Java by about 10 per cent. It encouraged the peasants to use fertilizer on seedbeds, to sow rice more thinly on the beds (thus producing stronger seedlings), and to plant the seedlings in rows so that weeding could be done with a special instrument, the *landak* (Fig. 59).[1] This weeder was developed in Japan. During the years immediately preceding 1939, these improvements in West Java resulted in an increase in output of unhusked rice amounting to 300,000 quintals, or 30,000 metric tons, with a value of nearly 1,000,000 guilders. This shows that some improvements in cultivation may increase production without a great capital outlay.[19]

Java may be compared only with southern China and with Japan in the cleanness of its rice fields. The Filipino does not pay much attention to weeding. The Malayan, Thai, Cambodian, Cochinchinese, and Filipino rice farmers have more flooded riceland per capita at their disposal than the people of Java and can thus afford to cultivate their land less intensively.

Irrigation Problems

Peasant irrigation works usually take care of the fields of only one village or of a small group of people who have joined together for the specific purpose of building and maintaining an irrigation system. These works consequently are small and usually inadequate, but nevertheless they de-

[17] "The chief commercial fertilizers used in Japan are pressed herrings, pressed sardines, dried sardines, other fish cakes, bone meal, soybean cake, rapeseed cake, cottonseed cake, other vegetable-oil cakes, ammonium sulphate, calcium cyanamide, calcium phosphate, and potassium phosphate. Calcium phosphate and ammonium sulphate are probably the most representative chemical fertilizers."—Wickizer and Bennett: The Rice Economy, 1941, p. 252, footnote 33.

[18] Departement van Economische Zaken: Voedselproblemen, 1940, p. 28.

[19] *Ibid.*, pp. 27–28.

[1] [See p. 117, category 116. -- Analyst]

1: Pelzer S-5 (1940-1941) 1945 AL1 Southeast Asia AL 1
Indonesia OB1

I
654
242
249

The Agricultural Advisory Service of the Netherlands Indies for many years carried on experiments with green manures and recommended a variety suitable for different conditions, but the main obstacle to the application of their research was the difficulty of introducing green manure into a crop rotation. Some of the green manures used in Java are *Crotolaria anagyroides* H. B. and K., *Crotolaria usaramoensis* Baker, *Tephrosia candida* DC. and *Tephrosia vogelii* Hook., *Calopogonium mucunoides* Desv., *Centrosema pubescens* Benth., *Centrosema plumierii* Benth., and *Mimosa invisa* Mart. Green manure requires a relatively large amount of water in order to produce the desired foliage. If there is sufficient water, the peasants can also grow other crops such as legumes, which supply food as well as fertilizer. Most of the peasants of Java have so little land that they cannot afford to sacrifice a single food crop from a field in spite of the probability of an increased yield after the green manure has been plowed under. Although it is preferable to grow green manure unmixed with other plants, the planting of a green manure crop among the food crops is recommended where land is scarce. This is done in Java, especially in maize and cassava fields. The specific green manure that is chosen should meet the following conditions:[59]

1. It should have a rapid growth,
2. An abundant production of leaves,
3. No excessive development that might harm the main crop,
4. An absence of climbing or trailing stems;
5. The plant should have deep roots with many nodules;
6. It should not become woody too easily—as herbaceous plants decompose much more quickly; and
7. It should be immune from the diseases and insects that attack the main crop.

SEA
241
242
249.

Another agricultural practice common to many parts of the world, especially the tropics, is mixed cropping, which seems to bring in its train some of the advantages of rotation.[60] Nicol stresses the great importance of having leguminous plants grown among non-leguminous plants. He points out that the legume component in the mixture provides nitrogen to the non-legume.[61] In various parts of India—for example on the Bombay Deccan—bulrush millet (*Pennisetum typhoideum* Rich.) is grown with various legumes. This can be done year after year without greatly affecting the fertility of the soil. No crop rotation is practiced here. The proportion of bulrush millet to legumes varies according to the quality of the land; the poorer the land, the smaller the proportion of millet and the larger the proportion of legumes. Wallace wrote in 1887:

The growth of mixed crops is a widespread practice which is well worth consideration and study. . . . The advantages . . . are distinctly great. . . . There is

[59] International Institute of Agriculture: Use of Leguminous Plants, 1936, p. 60.
[60] Willis: Agriculture in the Tropics, 1914, p. 29.
[61] Nicol: "Mixed Cropping," 1935, p. 189.

1: Pelzer S-5 (1940-1941) 1945 AL1 Southeast Asia AL1

241
242
249

but one explanation of the existence of these practices, viz., that they have been found advantageous after long experience and much careful consideration on the part of a body of workers who, for power of observation and an intelligent interest in and knowledge of every day occurrences, would put to shame those classes which hold a corresponding position in educated Europe.[62]

Well known is the American Indian's practice of interplanting maize, beans, and squash. Chinese and Japanese peasants practice mixed cropping widely, and we may observe it almost everywhere in Southeastern Asia. Intensive mixed cropping in the garden culture of Java has already been described (see above, pp. 43–45), but there is relatively little interplanting of legumes with non-legumes. On dry fields the peasants of some parts of Java are accustomed to interplant cassava and maize—both, however, non-legumes. Whereas maize can be harvested after 100 days, cassava needs up to a year or more of growth. Cowpea (*Vigna sinensis* Savi), Goa bean (*Psophocarpus tetragonolobus* DC.), Lima bean (large) (*Phaseolus lunatus* L.), and hyacinth bean (*Dolichos lablab* L.) are also interplanted with cassava. On tegalans in Bali, in 1941, I observed the following crops grown with upland rice: *Eleusine indica* Gaertn., sesame (*Sesamum indicum* L.), and pigeon pea (*Cajanus cajan*). This last enriches the soil as a result of its large production of leaves as well as by the nitrogen in its nodules.

Kaserer has noted that there is little or no interpenetration of plant roots of the same species when they are grown together, whereas a significant degree of root interpenetration takes place when two different species are grown in close association, the degree of interpenetration increasing with the degree of dissimilarity. In one experiment, for example, a legume and a non-legume showed the maximum amount of root interpenetration, the explanation apparently being that one plant takes up the nutrients produced, or made available, by the other.[63] If these observations are correct we have here a scientific argument for the value of mixed cropping. Further studies are needed to determine the desirability of improving and extending it in specific areas.

241
242

Another important method of improving the fertility of dry fields is the use of compost. Vegetable composts are employed extensively in India and Africa. The masters at making compost from household refuse, vegetable waste, and human excreta are the Chinese, who cling to this method of fertilization wherever they practice truck farming in the neighborhood of urban centers in Southeastern Asia. Fungi and bacteria are used to break down suitable mixtures of vegetable and animal wastes. A method that was developed in India is the "Indore process" in which, "by arranging these mixtures in the proper way, and by watering and turning them, to supply moisture and air, the waste materials are transformed in about ninety days into a finely divided humus rich in the foods required by grow-

[62] Wallace: India in 1887, 1888, pp. 196 and 198.
[63] Kaserer: "Beobachtungen," 1911, pp. 1022–1030.

1: Pelzer S-5 (1940-1941) 1945 AL1 Southeast Asia AL1

land. An example is *mongo* (*Phaseolus mungo* L.), grown in Pangasinan and Batangas. Alarmed by the poor rice crops in 1940 and the difficulty of importing rice from Indochina and Thailand, the Philippine Bureau of Plant Industry, early in 1941, started to distribute seed of quick-growing dry-field crops, especially maize and legumes, in order to supplement the nation's rice bowl. But the average Filipino farmer is reluctant to accept this new practice, because "it is not the custom"—a powerful argument not to be easily overcome.

[249] [654] 241

Dry-Field Crops Cultivated by Plantations

The discussion thus far has been limited to the native cultivation of dry land and to annual crops. However, extensive areas of non-irrigated land are occupied by perennial crops that are grown on plantations owned by Westerners. The crops produced include tea, coffee, cacao, quinine, rubber, palm oil, coconuts, kapok, sisal, and other fibre plants. Some of these crops were cultivated for a long time without the proper measures being taken to protect the soil against accelerated erosion. Although the detrimental effects of plantation agriculture in Ceylon and southern India are notorious in the plantation history of southern Asia, results were just as disastrous in Malaya and in the Netherlands Indies. Westerners, accustomed to clean cultivation or clean weeding in the temperate zone, carried this practice over into the tropics, with the result that soil erosion was very severe on steep slopes and led to great losses in soil fertility. Today, however, these mistakes have been recognized; there is hardly a plantation that has not adopted measures to protect sloping land against erosion and level land against soil exhaustion. The planters of Java were the pioneers in this field, introducing or developing most of the protective measures. These measures include contour drains, silt pits, contour ridges, terraces, hedges, shade trees, and especially cover crops. The use of these measures varies according to the crop, or crops, produced and according to climate, soil, and slope; but the purpose of all of them is to encourage an effective ground cover and to check the rate of water run-off. The financial depression of the 1930's—resulting in the need for very strict economy and a decrease in production costs—has helped considerably to reduce the amount of clean weeding and to convince conservative planters of the value of preserving a ground cover, litter, and mulch. Such measures help not only to retard erosion but also to enrich the soil. The first Western planter who broke away from the custom of keeping the ground of his plantation free from weeds was L. M. Tyl, who in the years 1890–96 developed the "weed-system" and thus introduced the idea of a ground cover into plantation circles of Southeastern Asia. But it took many years before his idea was generally accepted. It is interesting to note here that the Asiatic-owned plantations and the small holdings producing perennial crops, such as rubber, usually did not practice clean weeding. This, in the early days, was regarded by European observers as a sign of laziness and

241 177 185 242

1: Pelzer S-5 (1940-1941) 1945 AL1 Southeast Asia- AL1

241 177 185 242

poor management, but, as has been so often the case, the Westerners were finally forced to admit the soundness of Oriental cultivation practices.

As we have seen, there are two principal means of protecting the soil between tree crops: by allowing the growth of indigenous plants or weeds (in other words the development of a natural mixed cover), or by establishing a pure cover of leguminous plants, many of which came originally from the New World. Rubber planters in Malaya seem to have had more success with the first method, which has been called "the forestry method of cultivation" or "rubber forestry." [67] Of course, the growth of indigenous plants or weeds must be controlled, and this is done by slashing the undergrowth from time to time. Frequently it is necessary to practice selective weeding in order to suppress undesirable plants and encourage more valuable ones.

654 249

Much research has been directed toward the study of leguminous cover crops which supply nitrogen, as well as foliage for green manure. This research was started in 1910 in the Botanical Garden at Buitenzorg. Some of the cover crops that have proved especially valuable and are widely used on modern plantations are *Calopogonium mucunoides* Desv., *Centrosema pubescens* Benth., *Centrosema plumierii* Benth., *Desmodium* species, *Tephrosia candida* DC. and *Tephrosia vogelii* Hook., *Mimosa invisa* Mart., *Cassia* species, and *Vigna oligosperma* Backer.[68] Several of these have already been mentioned in the foregoing discussion on the use of green manure crops in native agriculture.

Because a number of perennials such as tea, coffee, and cacao are commonly grown under shade trees, many writers seem to believe that these plants need shade. This may be true in part, but more important is the fact that the shade trees protect the soil against excessive losses of moisture and undesirable changes in soil composition, texture, and structure and thus prevent a reduction of the quantity of humus in the soil. Most of the commonly used shade trees are legumes which, in addition to shade, supply litter and nitrogen and help to increase the moisture-holding capacity of the soil, thus reducing the danger of erosion. *Erythrina micropteryx* Poepp., *Erythrina lithosperma* Miq., *Leucaena glauca* Benth., *Albizzia moluccana* Miq., *Albizzia chinensis* Merr., *Albizzia falcata* Backer, *Pithecellobium dulce* Benth., or Manila tamarind, and *Peltophorum pterocarpum* Backer are especially useful in this respect.

---

[67] Haines: "The Uses and Control of Natural Undergrowth," 1934.

[68] For a very extensive list of cover crops, green manures, and shade trees, see Heyne: De nuttige planten van Nederlandsch-Indië, Vol. 3, 1927. See also International Institute of Agriculture: *op. cit.*

5: Dobby K-4 (no date) 1950 ALI Southeast Asia ALI

Cash farming for rice is the only extension of a Southeast Asia subsistence farming crop into commercial farming on a large scale; only a negligible proportion of coconut-growing is for export, though this too, is an extension of Southeast Asia subsistence farming. It has been inevitable that subsistence farmers and the techniques they developed for rice have set the character of commercial rice farming which has been pioneered by local people and continues to be essentially a non-mechanised produce whose volume comes more from area and less from intensive farming.

RICE IN SOUTHEAST ASIA:
ANNUAL AVERAGES PER QUINQUENNIUM

Period	*Million Acres Under Rice*	*Production Million Tons Clean Rice*	*Net Exports from SE.A. (Million Tons Clean)*	*Per Cap. Utilisation (kgms.)*	*Yield in Tons per Acre*
1916–20	38.3	13.5	3.9	119	.352
1921–25	43.6	15.3	4.6	137	.352
1926–30	47.5	16.5	4.7	131	.348
1931–35	49.6	16.7	5.2	117	.337
1936–40	51.4	17.5	5.0	118	.339
1946–50	48.1	15.6	1.9	98	.325

For 1951 *it is estimated that Southeast Asia sowed about* 50 *million acres of paddy, probably producing* 16 *million tons cleaned rice. The exports may total* 3 *million tons. These figures suggest the consumption had declined to below* 100 *kgms. per person, but this is not reliable since unreported dealings were going on and reported facts were not necessarily the true ones.*

Other Food Crops.—The other commercial food crops, sugar, coffee, tea, cinchona and oil palm total much smaller areas than rice farming. Broadly, these innovations were developed by European colonial planters opening up what were very largely virgin territories, normally in the form of large estates calling for a labour force which derived only in part from local people, the rest being obtained by introducing labour from outside. In the Philippines and in Java the first European essays in agriculture caused serious interactions on local land customs; in Siam an aristocratic feudal system enabled commercialisation to be introduced without external intervention. These crops tended to be perennial cultivations, taking advantage of the continuous growing season of the region. In due course this has led to a large production, causing the external price to drop, especially as there has

5: Dobby K-4 (no date) 1950 ALl Southeast Asia ALl

• 349 been similar commercialisation of the same crops in other tropical areas, all quickly reaching large-scale production of commodities which began as expensive luxuries and gradually cheapened to become low-priced semi-staple foods not offering any prospect of large returns for nominal outlays. Rivalries with other producing areas and speedy saturation of the world market has so far given these types of commercial agriculture a confused history of boom and depression, of rapid extension and then dereliction or scientific experiments to cheapen production. In these crops, techniques and methods more western than eastern have been used though mechanisation in the field has not been possible owing to the nature of the crops. The processing involved has often been modern and highly mechanised.

Rubber.—Commercial production of non-food or industrial crops in Southeast Asia has centred on rubber. Rubber has been an innovation peculiar to Southeast Asia (Central Africa and Ceylon took it up later) and its cultivation proved a remarkably successful transfer of a tree from another part of the tropics, developed here on plantation mass production lines, whereas in its original habitat the tree was wild and tapped on the "gatherer" system now only used for gums and damars collected from forest trees. Upon Southeast Asia rubber has depended the popularisation of the petrol driven vehicle, the incentive to petroleum production and the development of world road systems. Its cultivation was on the European orchard pattern and at first it was only possible by companies sufficiently capitalised to wait 7 to 10 years for maturity and to recruit labour from other regions to make the plantations in virgin areas, at a distance from subsistence farmers or cash farmers of foods to suit the plantation workers. Smallholders gradually took up rubber planting as an adjunct to other crops and as part of a mixed farming system. Reversing the history of rice agriculture, rubber started as a large-scale plantation cultivation worked by non-indigenous people and gradually moved towards a smallholder, mixed-farming type. Altogether, some 6 million acres of Southeast Asia are in rubber, the greatest single block being in Malaya. Rubber, too, is a perennial and a long-term crop and its history has been an alternation of high prices and low prices, and of rapidly saturating the market which has throughout been external to Asia. Malaya, by almost exclusively specialising in rubber, proved very highly geared to

5: Dobby K-4 (no date) 1950 ALl Southeast Asia ALl

external events and their effects on rubber price, to a degree not paralleled by other types of Southeast Asia farming which were, during a crisis, more closely related to subsistence farming and thereby buffered from external valuations.

Trends in Agriculture

Several long-term tendencies in these various farming types have become apparent. For all the commercial crops except rice, external events have obliged experiment and development towards higher and higher production per unit area; yields for commercial crops have progressively increased. In rice farming, however, methods have continued to be extensive, yields have steadily decreased and there has been little advance in either maintaining fertility standards or increasing the yield. Experimental farms exist throughout the territory to promote these improvements, but they have made little impression on the rice-farming community as a whole.

RICE YIELDS IN SOUTHEAST ASIA (hundred lbs. milled per acre)

	1934–35	1939–40	1944–45	1949–50
Burma	8.2	8.4	6.5	7.0
Indochina	5.7	5.5	5.6	6.6
Siam	9.1	8.6	7.5	6.6
Malaya	9.7	9.1	—	10.7
Java and Madoera	9.3	10.0	—	9.5
Philippines	5.8	5.8	6.8	6.6

By the quinquennium 1936–40 annual yields had declined nearly 4 per cent from those of 1916–20 and production had increased solely by increasing the acreages, whose annual average for the same quinquennial periods increased by 34 per cent.

The general movements of rice in Southeast Asia are evident from the table on page 356 which summarises surpluses and deficits over a period.

Commercial rice production was associated almost exclusively with the expansion of agriculture to the deltas of the Irrawaddy, Chao Praya and Mekong and in varying degrees to increased control over flood waters. It is in this large-scale water control that the greatest long-term changes have been set going by western engineering techniques coping with the wide range of circumstances under which Southeast Asia floods occur. Effective

that about one-third of its prewar estate area was being tapped in 1947, representing two-thirds of the area tappable.

In the food crops, surplus margins were more slowly restored. Exports of Southeast Asia rice totalled about a million tons during 1946, as against a combined export of 5.7 million tons annually for 1936–40. The drop in production of this staple was greatest in the case of Burma because there the dislocation by war had been greatest, but by the 1946–47 season, about two-thirds of Lower Burma rice acreages were back in cultivation, as against half in 1945–46. In Cochinchina over 70 per cent of the rice area was being cultivated in 1946–47. Siam which was untouched by military campaigns reported 10.6 million acres under cultivation in rice for 1946–47 (22 per cent more than 1939–40)—the only territory to show a substantial increase of rice acreage in the immediate postwar years.

A postwar feature has been the general decline in rice yields, mostly an effect of loss of draught cattle, though to report low yields was a convenient cover for black market sales. The consequence of lost production in local food was felt more in places like Malaya which has specialised in non-food commercial agriculture, than in any other territories of Asia, which customarily needed to import only a small margin and not the majority of their rice. For the Philippines in 1947, the United Nations reported that *per capita* consumption of rice was actually higher than in 1939 by about 5 per cent.

Since labour shortage has been prominent as a factor operating against postwar commercial agriculture, the subsistence farmer and the diversified smallholder have assumed far greater significance than before. Over 55 per cent of Malaya's rubber production for 1946 was from smallholders, a proportion which had been as much as 85 per cent in the early months of that year, yet fell to 45 per cent in 1950 (cf. 39 per cent in 1940).

The vegetable oils soon came back into production and by early 1947 monthly production in Southeast Asia was not far short of 1941 production and now exceeds it.

The general lowering of food acreages and of yields, combined with the enforced reversion to subsistence agricultural forms, has a special significance for Southeast Asia food supplies over the next few years, because the restricted food supply comes at a time when population is rapidly increasing, at the rate of about 20

5: Dobby K-4 (no date) 1950 ALl Southeast Asia ALl

434 averaged below $2 per person per annum and revenues were of that low order for all Southeast Asia countries except Malaya, where it was about $70 per person, a sign that Malaya, of all these countries, was the one where work and activities centred on money and had moved farthest from the subsistence principle.

It has to be noted that the small amount of money involved in such ecologies does not mean poverty in the European sense : it represents only that margin of necessities which is outside the subsistence ecology. In addition to the little money it obtains, each family in general has both its food and its domestic equipment produced by itself, or in conjunction with helpers from the village community. This is a state of society long since outgrown in Europe though we have to allow for it in every phase of Southeast Asia industry and trade and to assume it will continue to play a part in future changes.

Agricultural Processing

256 249 Because Southeast Asia is so overwhelmingly agricultural its mechanical industries relate largely to agricultural processes. Rice mills, sugar mills, starch factories (from sago and tapioca) and sack factories, have all grown up in connection with agricultural processing in every one of these territories. In addition, rubber factories, oil presses and sugar mills have been established on western lines in association with European-style agricultural developments. The fabrication of rubber has not gone far within this region; tyres have been made in Java where also mass-produced rubber shoes were made for Southeast Asia markets. For the most part, mechanical processing industries are located peripherally to the countries concerned and they operate primarily for immediate export, though small rice, brick and sugar factories have spread inland away from coastal sites.

Textiles

439 388 Apart from food, the chief personal need of Southeast Asia people is cloth and the demand for textiles ranks as by far the greatest single item of fabricated goods. Most of the textiles recorded are imported; the domestic industry has tended to disappear except in the remoter districts, and textile factories have not been set up to any extent within Southeast Asia. Cotton spinning at Semarang, Tegal and Damak and some 200 small